

SUPPORTING A POSITIONING OF AN APPARATUS THAT IS BASED ON PERIODIC TRANSMISSIONS OF THE APPARATUS

FIELD OF THE DISCLOSURE

[0001] The invention relates to the field of positioning, and more specifically to a positioning of a mobile apparatus that is based on periodic transmissions of information by the mobile apparatus.

BACKGROUND

[0002] Periodic transmissions of a mobile apparatus can be used to determine and track the position of a mobile apparatus in any area provided with a suitable infrastructure.

[0003] The mobile apparatus could be for instance a location tag that is to be used for asset tracking or a more complex device.

[0004] A positioning making use of periodic transmissions can be used for instance for achieving accurate positioning indoors; it may enable a resolution of down to 30 cm. It may be based for instance on low cost Bluetooth Low Energy (BT LE) technology, which is a feature of the Bluetooth 4.0 technology being standardized by the Bluetooth Special Interest Group (SIG).

[0005] A positioning system making use of periodic BT LE transmissions can be used with smart devices that locate themselves using a BT LE signal emitted by directional transceivers (DT). The directional transceivers are also referred to as beacons. Alternatively, a reversed mode of operation can be used. In this “asset tracking” mode, BT LE transceivers that are referred to as tags or location tags emit a signal that is picked up by directional transceivers. The signal is effectively a data packet that enables a directional transceiver to identify the tag and to calculate the direction vector from the directional transceiver towards the tag using a reception of the signal by multiple antennas of the directional transceiver. This process is also referred to as “tag update”. An infrastructure behind the directional transceivers may calculate the position of the tag based on the direction vectors determined by several directional receivers, if the location of each directional transceiver is known. The infrastructure may comprise to this end a positioning server that contains data buffering and position calculation functions. Additionally, the infrastructure may contain various management and application servers.

[0006] Location tags supporting the second operating mode can be particularly small and inexpensive, and they may be attached to any desired moving object. A location tag may comprise for instance a battery, some logic in the form of a microcontroller and radio parts. It may be configured to periodically transmit a signal in order to enable determination of positions of the tag. The positions may be used, for instance, for tracking an object to which the tag is associated. Typical frequencies of transmissions and thus of enabled location updates are 1, 10 or 50 times per second.

[0007] While a positioning of a mobile apparatus by means of periodic transmissions of the mobile apparatus can be realized in a positioning system using BT LE, it is to be understood that a similar approach can be used with various other systems and transmission technologies, for instance with a positioning system using active radio frequency identification (RFID).

SUMMARY OF SOME EMBODIMENTS OF THE INVENTION

[0008] An embodiment of a method according to the invention comprises monitoring at least one criterion for adjusting a frequency of a periodic transmission of information by a mobile apparatus via an air interface, the periodic transmission enabling a determination of positions of the mobile apparatus. The embodiment of the method further comprises causing an adjustment of the frequency, when it is detected that the at least one criterion is met.

[0009] A first embodiment of an apparatus according to the invention comprises one or more means for realizing the actions of the presented embodiment of the method according to the invention.

[0010] The means of this first embodiment of an apparatus can be implemented in hardware and/or software. They may comprise for instance a processor for executing computer program code for realizing the required functions, a memory storing the program code, or both. Alternatively, they could comprise for instance circuitry that is designed to realize the required functions, for example implemented in a chipset or a chip, like an integrated circuit.

[0011] A second embodiment of an apparatus according to the invention comprises at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the processor, cause an apparatus at least to perform the actions of the presented embodiment of the method according to the invention.

[0012] Moreover, an embodiment of a computer readable storage medium according to the invention is presented, in which computer program code is stored. The computer program code causes a device to perform the actions of the presented embodiment of the method according to the invention when executed by a processor.

[0013] The computer readable storage medium is a non-transient medium and could be for example a disk or a memory or the like. The computer program code could be stored in the computer readable storage medium in the form of instructions encoding the computer-readable storage medium. The computer readable storage medium may be intended for taking part in the operation of a device, like an internal or external hard disk of a computer, or be intended for distribution of the program code, like an optical disc or a memory stick.

[0014] It is to be understood that also the computer program code by itself has to be considered an embodiment of the invention.

[0015] An embodiment of a system according to the invention comprises a mobile apparatus and a positioning infrastructure. At least one of the mobile apparatus and a stationary apparatus of the positioning infrastructure is an embodiment of an apparatus according to the invention.

[0016] Any of the described apparatuses may comprise only the indicated components or one or more additional components. Furthermore, any of the described apparatuses may be a module or component for a device, or a fully functional device.

[0017] In one embodiment, the described method is an information providing method, and the described first apparatus is an information providing apparatus. In one embodiment, the means of the described first apparatus are processing means.